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REMARKS

Claims 1-31 were pending in the present application. Claims 32-36 have been added, and Claims 1-31 have been amended, leaving Claims 1-36 for consideration upon entry of the present amendment. No new matter has been entered by way of amendment. For example, Claims 1, 14, and 25 have been amended to add language that the conductive fiber is positioned to enhance an applied electric field. Support for the amendments can be found in paragraph 0041. All of the remaining dependent claims have been amended to address the informalities noted by the Examiner. Support for newly added Claims 32-34 can be found in paragraph 0042. Support for newly added Claims 35 and 36 can be found in paragraphs 0048, 0049, and 0055.

Reconsideration and allowance of the claims is respectfully requested in view of the above amendments and the following remarks.

Claim Objections

Claims 2-13, 15-24, and 26-31 have been amended to overcome the informalities noted by the Examiner. More particularly, the uppercase letter "C" in the term "claim" has been changed to the lower case as suggested by the Examiner. Accordingly, the objection has been rendered moot.

Claim Rejection under 35 U.S.C. § 112, second paragraph

Claim 30 stands rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In particular, the Office Action suggests that the phrase "amtosphere" renders the claim indefinite because it is unclear whether the limitation following the phrase is part of the claimed invention. Applicants respectfully traverse.

It is respectfully submitted that Claim 30 does not include the phrase "amtosphere". It is believed the Office Action is referring to Claim 31, which has been amended to correct the misspelling believed to be the cause of the rejection. There are no limitations following this phrase.

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The purpose of the requirement stated in the second paragraph of 35 U.S.C. §112 is to provide those who would endeavor, in future enterprise, to approach the area circumscribed by the claims of a patent, with the adequate notice demanded by due process of law, so that they may more readily and accurately determine the boundaries of protection involved and evaluate the possibility of infringement and dominance. *In re Hammack*, 427 F.2d 1378, 166 USPQ 204 (CCPA 1970). In the present case, the amended claim language does not render the boundaries of the claimed invention undeterminable.

Accordingly, it is respectfully submitted that Claim 31 is definite under 35 U.S.C. §112, second paragraph, and the rejection should be withdrawn.

Claim Rejection Under 35 U.S.C. § 102(b)

Claims 1-3, 8-9, 14-16, 25, and 27 stand rejected under 35 USC §102(b) as allegedly anticipated by Barnes et al. (U.S. Patent No. 6,218,773). Applicants respectfully traverse.

Before addressing this rejection in detail, it is respectfully submitted that the above noted patent number (i.e., U.S. Patent No. 6,218,773) cited in the Office Action is directed to a deflection yoke for cathode ray tubes and identifies Misono et al. as the named inventors. In view of the unrelated subject matter contained in the US 6,218,773 patent, it is believed that the Office Action intended to rely upon U.S. Patent No. 6,239,553 since this is the only patent identified in the Examiner's PTO-1449 disclosure form that includes Barnes et al. as the inventors. The Examiner is requested to immediately telephone Applicants' undersigned representative if this assumption is in error.

Under U.S.C. §102(b), a person is entitled to a patent unless the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, *more than one year prior to the date of application for patent* in the United States. [emphasis added]

Applicants' filing date for the instant application is November 01, 2001 whereas the Barnes et al. patent issued on May 29, 2001. Thus, a difference of about 5 months elapsed from the date of issue of the Barnes et al. patent to the filing of the present application.

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Accordingly, the Barnes et al. patent is not a proper §102(b) reference since less than one year has elapsed and as such, the rejection should be withdrawn.

First Claim Rejection Under 35 U.S.C. § 103(a)

Claims 4-5, 13, 17-18, 28, and 30 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,239,553 to Barnes et al. (hereinafter "Barnes") in view of U.S. Patent No. 4,762,603 to Morin et al. (hereinafter "Morin"). Applicants respectfully traverse.

Barnes is generally directed to an RF plasma source for generating a plasma. The RF plasma source includes a coil having a first coil segment, a second coil segment, an RF power source connected to the coil and an enclosure disposed between the first and second coil segments. The enclosure is disposed at an angle to the coil that is substantially perpendicular to the coil such that an axis A through the enclosure is substantially perpendicular to an axis B through the coil. In operation, an RF power source supplies RF energy to the coil to excite a gas flowing though the enclosure into a plasma state.

Morin is generally directed to a process for forming electrodes. The electrodes include a plurality of fibers, wherein each fiber has at least one thin metallic coating.

Applicants' independent Claims 1, and 14 are directed to a plasma tube and plasma tool, respectively, that include, inter alia, a conductive fiber secured to a plasma tube and positioned to enhance an applied electric field. Independent Claim 25 is directed to a process for reducing the electric field breakdown point of a gas that includes, inter alia, securing the conductive fiber to a plasma tube, wherein the conductive fiber is positioned to enhance an applied electric field.

For an obviousness rejection to be proper, the Examiner must meet the burden of establishing a prima facie case of obviousness. *In re Fine*, 5 U.S.P.Q. 2d 1596, 1598 (Fed. Cir. 1988). Establishing a prima facie case of obviousness requires that all elements of the invention be disclosed in the prior art. *In re Wilson*, 165 U.S.P.Q. 494, 496 (C.C.P.A 1970).

Applicants respectfully assert that a prima facie case has not been established. Barnes fails to teach or suggest, inter alia, the feature of a conductive fiber secured to a plasma tube

and positioned to enhance an applied electric field. Rather, Barnes teaches and suggests orienting the coil at an angle that is perpendicular to the longitudinal axis defined by the plasma tube. The result of this orientation, as taught and suggested by Barnes, will have no effect on the enhancement of the electrical field.

As noted in Applicants' paragraph 0041, an increased electrical field enhancement is observed as the angle of the conductive fiber is oriented closer to parallel to the applied electric field. With a fiber of fixed length oriented at an angle not substantially parallel to the applied electric field, its effective length along the electric field is reduced by cos θ, where θ is the angle of the fiber with respect to the electric field. As Applicants observed in the case of argon, electric field breakdown of the gas was not observed at angles of about 60 degrees or greater from the applied electric field (see Figure 5).

In Barnes, the applied electrical field will be along the longitudinal axis of the plasma tube. Orienting the coil at an angle that is perpendicular to the applied electric field will not provide any enhancement to electric field breakdown. Since the effective length of the conductive fiber is reduced as a function of cos θ, orienting the coil at an angle perpendicular to the electric field will reduce the effective length of the conductive fiber to zero (cos 90 = 0), thereby providing no enhancement of the electric field. Moreover, it is pointed out that Barnes is directed to a plasma source, e.g., an RF coil for generating a plasma. Applicants' conductive fiber is not a plasma source by itself. Rather the conductive fiber is disposed in an energized field to reduce the effective electric field breakdown of a gas. This is markedly different from an RF plasma source. Morin is directed to different electrode materials (non-analogous art), and as such, fails to compensate for the deficiencies of Barnes et al.

Since the cited references, individually or in combination, fail to teach or suggest a plasma tube, a plasma tool, or process that includes the feature of a conductive fiber secured to a plasma tube and positioned to enhance an applied electric field, the rejections of independent Claims 1, 14, and 25 as well as dependent Claims 2-13, 15-24, and 26-31 are respectfully requested to be withdrawn.

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Second Claim Rejection Under 35 U.S.C. § 103(a)

Claims 6-7, 10-12, 19, 24, and 29 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,239,553 to Barnes et al. (hereinafter "Barnes"). Applicants respectfully traverse this rejection

For reasons discussed, Barnes fails to teach or suggest a conductive fiber secured to a plasma tube and positioned to enhance an applied electric field. Moreover, it has previously been pointed out that Barnes is directed to a plasma source, e.g., an RF coil for generating plasma. The coil passes through the plasma tube and is connected directly to a power source. As such, the use of the RF coil is provides an electric field to the gases passing through the plasma tube. The coil does not enhance an existing electric field. This is markedly different from the conductive fiber as claimed.

Accordingly, it is respectfully requested that the rejection be withdrawn.

Third Claim Rejection Under 35 U.S.C. § 103(a)

Claims 20-23, and 26 stand rejected under 35 U.S.C. § 103(a), as allegedly unpatentable over U.S. Patent No. 6,239,553 to Barnes et al. (hereinafter "Barnes") and U.S. Patent No. 4,762,603 to Morin et al. (hereinafter "Morin") in view of U.S. Patent No. 6,351,070 to Barry. Applicants respectfully traverse this rejection.

As previously discussed, Barnes fails to teach or suggest a conductive fiber secured to a plasma tube and positioned to enhance an applied electric field.

Morin is generally directed to a process for forming electrodes that include a plurality of fibers, wherein each fiber has at least one thin metallic coating. As such Morin fails to compensate for the deficiencies of Barnes.

Barry is generally directed to a microwave powered lamp and fails to compensate for the deficiencies of the primary reference, Barnes.

Accordingly, it is respectfully requested that the rejection be withdrawn.

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If there are any additional charges with respect to this Amendment or otherwise, please charge them to Deposit Account No. 06-1130 maintained by Applicants' Attorneys.

Respectfully submitted,

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CANTOR COLBURN LLP
Applicants' Attorneys

Date: September 26, 2002

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Marked-up versions of Claims 1-31 are as follows:

1. (Amended/Marked up) A plasma tube comprising:

an open ended cylindrical body, wherein the body includes a gas inlet at one end, and an outlet at an other end; and

at least one conductive fiber secured to the body and positioned to enhance an applied electric field.

2. (Amended/Marked up) The plasma tube according to [Claim] claim 1, wherein a portion of the conductive fiber is encased within a protective coating.

3. (Amended/Marked up) The plasma tube according to [Claim] claim 1, wherein a portion of the conductive fiber is in contact with the body.

4. (Amended/Marked up) The plasma tube according to [Claim] claim 1, wherein the conductive fiber comprises a material selected from the group consisting of tantalum, tungsten, gold, copper, silver, molybdenum, aluminum, carbon, graphite, palladium, platinum, ceramics, and composites or compositions comprising at least one of the foregoing materials.

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5. (Amended/Marked up) The plasma tube according to [Claim] claim 1, wherein the conductive fiber is a platinum coated silicon carbide fiber.

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6. (Amended/Marked up) The plasma tube according to [Claim] claim 1, wherein the conductive fiber comprises a length of less than about 10 millimeters.

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7. (Amended/Marked up) The plasma tube according to [Claim] claim 1, wherein the conductive fiber comprises a length of about 3 millimeters to about 5 millimeters.

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8. (Amended/Marked up) The plasma tube according to [Claim] claim 1, wherein the cylindrical body comprises a material selected from the group consisting of sapphire, quartz, alumina coated quartz and combinations comprising at least one the materials.

9. (Amended/Marked up) The plasma tube according to [Claim] claim 2, wherein the protective coating comprises a dielectric material.

10. (Amended/Marked up) The plasma tube according to [Claim] claim 9, wherein the dielectric material is silicon dioxide.

11. (Amended/Marked up) The plasma tube according to [Claim] claim 1, wherein the conductive fiber is secured to an inner surface of the plasma tube.

12. (Amended/Marked up) The plasma tube according [Claim] claim 8, wherein the conductive fiber is secured to the body at an angle substantially parallel to a length of the tube.

13. (Amended/Marked up) The plasma tube according to [Claim] claim 8, wherein the at least one fiber has a thickness less than about 100 microns.

14. (Amended/Marked up) A plasma tool comprising:

a plasma generating chamber comprising a plasma tube, wherein the plasma tube comprises an open ended cylindrical body, wherein the body includes a gas inlet at one end an outlet opening at an other end, and at least one conductive fiber secured to the body and positioned to enhance an applied electric field; and

an energy source in operative communication with the plasma tube.

15. (Amended/Marked up) The plasma tool according to [Claim] claim 14, wherein the energy source is selected from the group consisting of microwave energy, radiofrequency energy, and a combination comprising at least one of the foregoing energy sources.

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16. (Amended/Marked up) The plasma tool according to [Claim] claim 14, wherein the conductive fiber is encased with a dielectric material.

17. (Amended/Marked up) The plasma tool according to [Claim] claim 14, wherein the conductive fiber comprises a material selected from the group consisting of tantalum, tungsten, molybdenum, aluminum, carbon, graphite, palladium, gold, copper, silver, platinum, ceramics, and composites or compositions comprising at least one of the foregoing materials.

18. (Amended/Marked up) The plasma tool according to [Claim] claim 14, wherein the conductive fiber is a platinum coated silicon carbide fiber.

19. (Amended/Marked up) The plasma tool according to [Claim] claim 14, wherein the conductive fiber is secured to an inner surface of the plasma tube.

20. (Amended/Marked up) The plasma tool according to [Claim] claim 14, further comprising a light source, wherein radiation emitted from the light source is focused at a point within the plasma tube.

21. (Amended/Marked up) The plasma tool according to [Claim] claim 20, wherein the radiation comprises ultraviolet radiation.

22. (Amended/Marked up) The plasma tool according to [Claim] claim 20, wherein the at least one fiber has a thickness less than about 100 microns.

23. (Amended/Marked up) The plasma discharge tool according to [Claim] claim 14, wherein the at least one fiber is at least partially aligned with the electric field.

24. (Amended/Marked up) The plasma discharge tool according to [Claim] claim 14, wherein the at least one fiber is at substantially parallel to the applied electric field.

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25. (Amended/Marked up) A process for reducing the electric field breakdown point of a gas, the process comprising:

securing a conductive fiber to a surface of a plasma tube, wherein the plasma tube comprises an open ended cylindrical body, wherein the body includes a gas inlet at one end, an outlet at an other end, and [at least one conductive fiber in contact with the body] wherein the conductive fiber is positioned to enhance an applied electric field;

flowing a gas into the gas inlet of the plasma tube;

applying an electric field to the gas flowing in the plasma tube to form a plasma; and

discharging the plasma from the outlet of the plasma tube.

26. (Amended/Marked up) The process according to [Claim] claim 25, further comprising focusing radiation emitted from a light source at a point within the plasma tube.

27. (Amended/Marked up) The process of [Claim] claim 25, wherein the applied electric field is generated from an energy source selected from the group consisting of microwave energy, radiofrequency energy, and combinations comprising at least one of the energy sources.

28. (Amended/Marked up) The process of [Claim] claim 25, wherein the conductive fiber comprises a material selected from the group consisting of tantalum, tungsten, gold, copper, silver, molybdenum, aluminum, carbon, graphite, palladium, platinum, ceramics, and composites or compositions comprising at least one of the foregoing materials.

29. (Amended/Marked up) The process of [Claim] claim 25, wherein the conductive fiber is secured to the body at an angle substantially parallel to the plasma tube.

30. (Amended/Marked up) The process of [Claim] claim 25, wherein the at least one fiber has a thickness less than about 100 microns.

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31. (Amended/Marked up) The process of [Claim] claim 25, wherein the gas flows at a pressure less than 1 [amtosphere] atmosphere.